

Attachment A
A Brief Summary of Military Occupation Specialties Required
to Know Morse Code Skills of any Kind in the U. S. Army
Plus Some Public Sources of Information on Military Radio Equipment

All of the following are included to dispel any false ideas about military radio communication or to offer true information on such for today. These are specifically about Morse Code since that is the major subject of commentary on the seven petitions for rulemaking.

MOS - Military Occupation Specialty (military jobs)

All military personnel have specific Military Occupation Specialties, referred to as “MOSs” and Army MOSs are pronounced as the three separate letters of the acronym. MOSs exist in all branches of the United States military, including those for commissioned officers and warrant officers. Technically, the designations for all occupation specialties are “MOC” or Military Occupation Code. By common use throughout the branches, the M-O-S term is used here. The United States Navy has occupation codes as a varying mix of either letters and numbers as of 1997. The United States Air Force has sequences of numbers and letters in a 4 to 5 digit arrangement, again since 1997. The United States Marine Corps uses, again since 1997, a 4-digit numerical code. The United States Army occupation codes are two numeric characters followed by a single suffix letter. The following are brief descriptions of the only MOSs indicated as knowing Morse Code in the United States Army. These descriptions are verbatim extracts from information available at <http://www.goarmy.com> on the Internet. That website is information about all U.S.Army jobs and what they entail, the website owned and operated by the U.S. Army.

98C (“ninety-eight charlie”) Signals Intelligence Analyst

“Learning what foreign governments and forces are involved in helps our military experts better plan our nation’s defense. That’s where an Signals Intelligence Analyst is most valuable. They listen to and intercept foreign radio transmissions and relay that information by producing combat, strategic, and tactical intelligence reports.”

“As an Signals Intelligence Analyst, you may be involved in:

- o Recording radio signals coming in from foreign forces.
- o Studying radio signals to understand the tactics used by foreign military forces.
- o Locating the sources of foreign radio signals.
- o Translating Morse code.
- o Keeping logs of signals interceptions.”

98H (“ninety-eight hotel”) Communications Locator/Interceptor

“The Communications Locator/Interceptor is primarily responsible for performing and supervising the detection, acquisition, location and identification of foreign communications using International

Morse Code (IMC) and radio-printer (non-Morse), as well as signals intelligence/electronic warfare (SIGINT/EW) collection and location equipment. Some of your duties as a Communications Locator/Interceptor may include:

- o Operating SIGINT/EW equipment to detect, acquire, identify, locate and exploit foreign communications devices transmitting Morse and non-Morse signals.
- o Providing processing and reporting of intercepted communications.”

All of the “ninety-eights” are involved in Military Intelligence activities, that is, to receive and gather information. Passive reception as opposed to two-way communications. Morse Code cognition and identification and translation is taught at the Military Intelligence School at Fort Huachuca, AZ. Fort Huachuca’s M.I. School is also the center for all military branches’ Morse Code cognition training as well as for all agencies of the U. S. federal government. Other MOSs involving Military Intelligence are the ninety-sixes and ninety-sevens, neither group requiring any Morse Code skill.

The “thirty-ones” (MOS beginning with numeral 31) are involved in direct tactical communications activities and nearly all are trained at the Signal Center, Fort Gordon, GA. None of the thirty-ones group are involved with Morse Code communication although most training classes include brief familiarity with its existence.

The “eighteens” group are all Special Operations Team specialties. Formerly known as Rangers and Green Berets, and sometimes mislabeled as “Special Forces,” Special Operations Team members are all required to experience rigorous mental and physical training and possess knowledge of a variety of specialized tasks. There is only one Special Operations Team MOS that is required to know Morse Code:.

18E (“eighteen echo”) Special Operations Communications Sergeant

“Special Operations Soldiers in the Army will conduct offensive raids, demolitions, intelligence, search and rescue and other missions from air, land or sea. Special Operations Communications Sergeants can operate every kind of communications gear, from encrypted satellite communications systems to old-style high-frequency (HF) Morse key systems. They also have serious computer/networking skills.”

Note: All of the eighteens are closed to female personnel.

While the Army’s description above seems a bit exaggerated (“...operate every kind...”), there is available public-distribution literature that describes a wide variety of military land force radio equipment.

SOURCES OF PUBLIC-DISTRIBUTION INFORMATION ON MILITARY RADIO EQUIPMENT

The most comprehensive document on existing land force radio communications equipment is Field Manual FM 24-24, dated 29 December 1994, entitled “Signal Data References: Signal Equipment.” Over 400 pages in size, it includes illustrations and main technical characteristics of then-current (1994) radio communications equipment.

FM 24-24 is available for free download in PDF from the General Dennis J. Reimer Army Doctrine Training Digital Library at <http://www.adtdl.army.mil/atdls.html>.

Many of the specific radio systems described in FM 24-24 mention “CW control” but that must be taken in light of a long-standing design policy about local control of the RF carrier at the operating point. That is to not only allow working with automatic relay adapters (one station to another) to having the ability to immediately shut down a transmitter for fear of Direction Finding detection. This does not mean that all equipment using “CW” as a descriptor are capable of Morse Code keying.

Field Manual FM 24-18, dated 30 September 1987, entitled “Tactical Single-Channel Radio Communications Techniques” is also available for public distribution from the Army Doctrine and Training Digital Library. This document is a revision and update of a much earlier Field Manual on the same subject. FM 24-18 is one of the last manuals to mention manual Morse Code radiotelegraphy used in Army radio communication.

The Signal Center at Fort Gordon, GA, has a full course description for all the thirty-one group MOSs and may still contain some public-distribution animated computer training courses on certain radio equipment. None of the thirty-ones group required any training in Morse Code cognition techniques. Note: Site navigation to reach inner pages is usually difficult due to web page design and organization. That may or may not have been corrected by this time. The following web page at Fort Gordon contains links to computer tutorials on several Signal radio systems, checked on 17 October 2003:

<http://www.gordon.army.mil/roa/course/S6/info.htm>

Of several downloadable tutorials are two on the SINCGARS (Single Channel Ground Air Radio System), the several vehicular versions based on the AN/PRC-119 basic manpack small-unit radio in wide use in the U. S. military. SINCGARS began operational fielding just before the first Gulf War in 1990 and continues in production now at ITT, Fort Wayne, IN. ITT had reported publicly in 2002 that a total of 240,000 radio units had been produced then with more to follow. Total production by mid-2003 should exceed a quarter million SINCGARS transceivers in the past two decades.

The SINCGARS and SIP (SINCGARS Improvement Plan) small-unit radios are described well on four PDF files downloadable from ITT Aerospace and Communications Division <http://www.acd.itt.com>.

The publicly-available information on the Internet as to USN, USAF, or USMC communications equipment and operator/maintainer skill requirements is quite minimal compared to Army information. Nonetheless, mentions or even hints of Morse Code use or communications interception is absent. USN occupation descriptions of a very general sort are available at <http://www.navy.com/index.jsp>.

Electronics Industry controlled-circulation periodicals contain much public information on radio equipment contracts, awards, and some technical information. Such periodicals include EDN, Electronic Design, RF Design, Microwaves and RF, and several others. The Proceedings of the IEEE and some of the many IEEE Transactions monthly and quarterly periodicals may feature specific technical dissertations on military electronics. There are many and varied industry newsletters, contract request-award newsbriefs published by both the U. S. government and electronics industry organizations concerning military electronics. Little of that is either classified or sensitive in nature. That such information is not widely known is not a matter of national security but rather that it is of little interest to anyone outside of military electronics manufacture or sales. Equipment suitable for Morse Code use or operation is conspicuously absent and has been absent for at least two decades.

There are many and varied Internet sites which purport to contain “official government information” or inferences to that effect, concerning military radios. Nearly all such sites are from hobbyist groups, sellers of surplus government equipment (including international dealers), and special-interest groups such as old radio equipment collectors. A few sites are “concerned citizen” groups purporting to speak for some organization and referencing their viewpoints with official, but outdated and obsolete released-for-public-distribution documents. One such site, a “federation of American scientists,” includes a purported USN document describing the entire communications equipment aboard nuclear missile submarines, complete with illustrations. None of the descriptions have anything about Morse Code capability or use by the military of today.

Publications from the Rand Corporation, Santa Monica, CA, cover a broad spectrum of national and industry interest. Rand Corporation is a research organization, familiarly referred to as a “think tank.” Hundreds of studies’ reports are available by mail order for printed versions (at modest prices) or free download from their Internet site at <http://www.rand.org>. Their publication bibliographies for years 1980 through 2002 (50 pages in PDF) or 1980 and prior (69 pages in PDF) have nothing on Morse Code or telegraphy.

Emotional Inferences and Entertainment Media

One of the arguments of the First Class CW Club and Potomac Radio Club reference “U. S. Army Rangers using Morse Code.” Actually, only an eighteen-echo or Special Operations Communications Sergeant is required to **know** Morse Code. All other eighteens are not required to know it. None of the public statements by the Army or Department of Defense says an eighteen-echo actually uses it on special operations. All tactics and doctrine for Special Operations is a sensitive area and not for public distribution. The same is true for the USN SEAL teams, all of whom are also rare individuals of great physical and mental endurance.

The easy and very emotionally satisfying thought to those passionate over Morse Code use that it has some sort of “equality” to special operations. That is pure daydreaming. All Special Operations Teams and SEAL Teams have a glamorous, fascinating, admirable side which is well-suited for entirely fictional exploits of heroism depicted in the entertainment media. The entertainment media’s output is **fiction** catering to **wish-fulfillment**.

To be coldly logical about military clandestine or “stealthy” special operations, one must consider that such teams must be into an area, perform their duties with minimal chance of discovery, then leave. That requires rapidity and security. The AN/PSC-7 portable transceiver can be manpacked into denied territory and communicate over the military aviation frequency band of 225 to 400 MHz with a choice of directional antennas. With that frequency band, it can communicate with military satellites such as TDRS or with orbiting aircraft (Joint Stars is a possibility) and minimize interception from unfriendlies in the denied territory. Intelligence information can be sent quickly at high data rates with the option of encryption. That minimizes the ability of unfriendlies to intercept transmissions or to discover the content of messages to understand what operations are occurring. Using an AN/PRC-104 HF transceiver (also manpack) with Morse Code on-off keying allows unfriendlies to direction-find from ground intercept stations. Manual Morse Code is quite lengthy in transmission time; 100 5-character encrypted code words would require 5 minutes minimum to transmit for a short intelligence report “from behind enemy lines.” An AN/PSC-7

could link and send the same message in just a few seconds (slightly longer for the AN/PSC-3 available during the 1990-1991 Gulf War)...and with the transmitted signal directional and upwards instead of horizontally omnidirectional as with man-portable HF whip antennas.

In actual communications of the U. S. armed forces of today, and of a decade ago, there is **no Morse Code used for tactical communications, all major military branches.** That everyday, round-the-clock activity far out-shadows the few rare cases of any communications from implanted special operations teams...who probably do not use Morse Code for any purpose.

Leonard H. Anderson
20 October 2003

Attachment B

An Approximation of the Number of Non-Amateur Radios Used for Two-Way Communications in the United States

This attachment is an attempt to look at the non-military side of communications capabilities in the United States under extreme worst-case conditions where there is a possibility of using **any two-way radio** for emergency or disaster communications other than Mass Media broadcasters.

There is no easily-obtained data source for numbers of radio sets capable of two-way communications in the United States. On the Commission's website there is information on the recent Private Land Mobile Radio Service (PLMRS) license audit now in progress. From that there are 396,430 total PLMRS callsigns with (at date of writing) 93% respondents.

Private Land Mobile Radio Service encompasses Public Safety Radio (police, fire, medical, ambulance, etc.) as well as businesses of many kinds, religious organizations, not directly involved with federal government agency communications. Without downloading the entire database of licensees and developing a sorting and searching data reduction program, one can infer that one callsign will apply to two or more radio sets used under that callsign. That would put the total number of PLMRS two-way radios at approximately **one million** in operating state.¹ The majority will be in the VHF and UHF bands.

Cellular telephony and paging services would be under Commercial Mobile Radio Services. Discounting cellular telephony due to their direct connection with the Public Switched Telephone Network, one might apply paging services as "one-way communications" devices with paging receivers. The number of receivers can be approximated by the number of paging service subscribers for a particular service company. That information can be inferred from FCC 03-150A1, "Eighth Report on Analysis of Market Conditions With Respect to Commercial Mobile Service."

Railroad radio approximate figures are given in NTIA Special Publication 01-49, January 2002, "Current and Future Spectrum Use by the Energy, Water, and Railroad Industries." In that, the railroad industry is stated as having 16,000 base stations, 45,000 mobile radios, and 125,000 portable, hand-carry radios for a total of 186,000, all on VHF-UHF bands. No radio amounts are cited for Energy or Water Industries. Railroads cover the United States with 230,000 miles of track.

In NTIA Special Publication 01-48, "Alternative Frequencies For Use By Public Safety Systems," December 2001, the U. S. Department of Agriculture is cited as having 70,000 radios for many different purposes. No specifics are given as to type and location (fixed or mobile or portable). USDA radios, like all other federal agency radios, are not licensed or regulated by the FCC. No amounts of radio sets are given for other federal agencies.

All federal, state, and local governments plus all businesses and private organizations with radios have a potential for providing extreme emergency or disaster communications, solely from the large numbers of radios in those entities. There exists one network specifically on HF that has been in existence since before

¹ Presumption is one base station and some unknown number of mobile stations, at least one such.

1998: SHARES.

SHARES (for SHARed RESources on HF) is part of the National Communications System (NCS) that has the role of planning and preparing for national security and emergency preparedness. It is composed of 1,101 HF radio stations, representing 91 Federal, state, and industry resource contributors, stations in all states plus 20 overseas locations.² NCS and SHARES were in existence before the infamous terrorist attacks on the United States during 11 September 2001.

HF permits long-distance communications, much farther than the line-of-sight distances of VHF and UHF. One hardly-thought-of resource exists in the many communications satellite providers. Those can provide broadband relay all across the U. S. A. and to other nations. Satellites would be immune to terrestrial emergencies or disasters.

No mention has been made of mobile Citizens Band Radio Service radios on the 27 MHz CB band now in existence and operating daily on the nation's roadways. The numbers of such radios are not immediately available but could be inferred from shipping records since nearly all such transceivers are manufactured off-shore. It would be safe to say that the quantity exceeds a million units as of this date.³ Communications at the high end of HF is normally suitable for line-of-sight distances but can gain range from ionospheric reflection under certain conditions.

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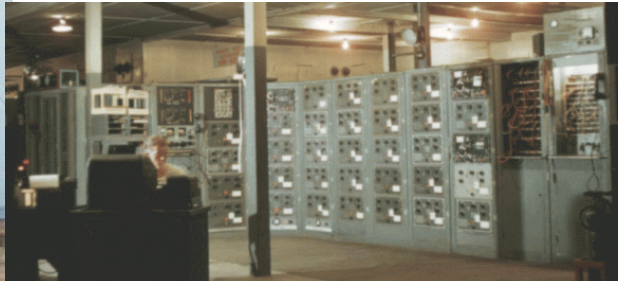
² Number of HF stations current as of June, 2003. This and more information available at <http://www.ncs.gov/n3/shares/overview.htm>.

³ The "Class D Citizens Band" (original name) 27 MHz band was put into existence in 1958 by the Commission. Regulated under Part 95 of Title 47 C. F. R., no operator or station license is required. A "CB radio" has become a standard appliance in the cabs of tractor-trailer trucks all over North America over the last 45 years..

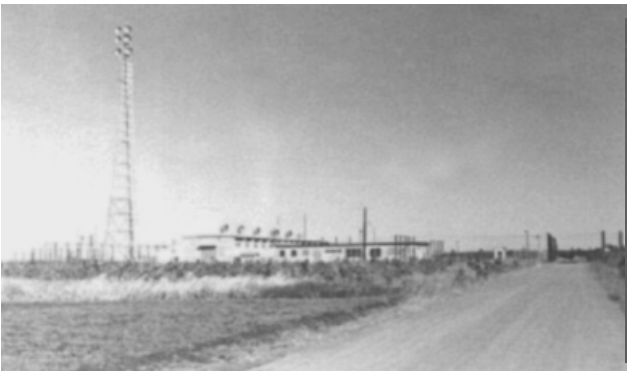
Attachment C
Brief Description of U. S. Army Radio Station ADA
Primary Communications Facility of Far East Command
Headquarters in Tokyo, Japan during 1953 to 1956



Above, first transmitters site of ADA on Tsukushima island at edge of Tokyo Bay, approximately 250 acres of antenna field devoted solely to HF wire antennas. ADA operated here from 1946 to 1954, beginning a move to a new site at Kashiwa in 1954.



Right above, transmitters control console with FSK exciter rack behind. Primary mode was RTTY single and 4-channel plus 4 SSB (12 KHz BW, 4-voice-channel commercial) and one AM transmitter, all 36 transmitters on HF, RF power outputs from 1 KW to 15 KW. Right below, shot of main transmitters room with control console in center, ringed by transmitters.



Above left, new site of ADA transmitters at Kashiwa, Japan, at center of 403 acre antenna field. 1.8 GHz microwave radio relay with antennas at top of 200 foot tower provide all linkage to outside world. Above right, interior of main transmitter building now containing 43 transmitters ranging from 1 to 40 KW power output, arranged in parallel rows. Transmitters was manned by C Company, Far East Command Signal Service Battalion and new site was self-contained with 600 KWe on-site electrical generation 24 hours a day, 7 days a week. Primary radio paths were to San Francisco, Seattle, Anchorage, Hawaii, Manila, Seoul, Pusan, Okinawa, and Saigon. Receiver site was 25 miles away NW of Tokyo with an antenna field



encompassing 395 acres, a joint operation of the Army and USAF.

Control, the functioning center for ADA near Camp Drake. Control directed QSYs and general circuit control via voice and TTY order wires. Control was in a relatively sound-proof end of the torn-tape teleprinter relay floor shown below.

All written radio communications was done by teleprinter. No manual morse telegraphy had been used on ACAN (Army Command Administrative Network) worldwide since 1948. Throughput of relayed teleprinter messages via ADA tape relay was 220,000 messages per month in 1955. Some TTY circuits were encrypted and appeared at tape relay as garble on the chadless tape with overprinting. Encryption center was elsewhere. Over 200 teleprinter send-receive racks and copying printer-punchers were in constant operation on this floor. One day's

worth of used paper tape filled a chute leading to a burn facility two stories below.

Control duty officers manually calculated frequencies to be used at specific times on specific paths. Ionosondes were not yet fully operational then for determining ionosphere conditions. Control had to depend on receivers site relative reported signal strengths to confirm calculations for new frequencies. ADA was considered only the 3rd largest Army HF communications facility during the early 1950s. In a relocation and Japan occupancy reduction effort in 1963, the U. S. Air Force took over the entire ADA HF communications facility and operated it until 1978 closure. Callsign ADA remains as that of the U. S. Army Pacific Headquarters at Fort Shafter, Hawaii.

Few realize the extent of U. S. military communications after World War Two and for the four decades following, the merging of all into the Defense Communications System (DCS), the introduction of the AUTOMATIC Digital Network of AUTODIN for higher rates of message throughput...culminating in the eventual use of DSN (Digital Switched Network), "the government's own Internet" with ability to send and receive encrypted data as well as its use for ordinary telephony. Today the DSN reaches far and wide by fiber-optic cable, microwave radio relay, communications satellite relay. HF radio is alive and well in the U. S. military but is now relegated to a back-up role, not as a primary.

My assignment to station ADA was February 1953 to January 1956. This sampling of photos is from my own collection, used to illustrate the point that the U. S. Army did not use Morse Code for long-distance primary communications, didn't need it in light of all the other modes available a half century ago, and never planned on such use after 1948.

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